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Impact of the Affordable Care Act on elective general surgery clinical practice☆

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ABSTRACT

Background: The Affordable Care Act (ACA) dramatically changed the healthcare system in the United States. This study aims to analyze the impact of the ACA on general surgery clinic visits and resultant procedures.
Methods: A retrospective review was conducted on new patients who presented to the elective general surgery clinic at an academic medical center between Jan. 1, 2012 and Dec. 31, 2015. Based on the open enrollment start date of Jan.1, 2014 patients were divided into pre-ACA and post-ACA periods. Data on demographics, type of insurance, missed appointments, and elective surgical procedures performed were collected.
Results: Medi-Cal insurance coverage increased post-ACA from 20.9% to 56.7%, $p < 0.001$; self-pay status went from 9.8% to 0%. There were 296 (35.4%) surgical procedures performed pre-ACA and 347 (37.1%) post-ACA ($p = 0.445$). Missed clinic visits decreased after implementation of the ACA, with 26.8% no-shows pre-ACA and 20.7% no-shows post-ACA ($p = 0.003$).
Conclusion: The ACA had a profound impact on the general surgery clinic with fewer uninsured patients, fewer no-shows and a modest increase in the number of procedures performed.
Summary: In 2014 the Affordable Care Act mandate was implemented. This legislation impacted healthcare by significantly decreasing the number of uninsured patients and increasing overall volume in one general surgery clinic.

Introduction

The Patient Protection and Affordable Care Act (ACA) is perhaps the most important and controversial piece of healthcare legislation implemented in the United States in recent decades. While the permanence of this healthcare law remains in question, it is important to understand the impact it has had to date. The ACA was signed into law in 2010. However, many of the regulatory changes, including the individual mandate, did not come into effect until 2014. This also coincided with the opening of the public marketplace. Though open enrollment in the public marketplace began in October of 2013, the coverage did not take effect until January 2014. Another major component of the ACA was the option for states to adopt the Medicaid expansion. California was among the states that chose to expand Medicaid, which is titled Medi-Cal in California. These changes have been projected to have a profound impact on surgical care across the nation.[1] Understanding the effects of the ACA on surgical care is imperative to the surgical community.

Several studies have attempted to predict the impact of the ACA in particular surgical subspecialties, including plastic surgery and cardiothoracic surgery.[2–4] However, there are few studies that have examined its actual impact on patient care and healthcare systems. One study compared a state that adopted Medicaid expansion with one that did not and analyzed cardiac surgery volume and outcomes. The authors found that "Medicaid expansion was associated with

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fewer uninsured cardiac surgery patients and improved predicted risk scores and morbidity rates."[5] These results are intriguing and raise the question of whether similar results would be found in other surgical subspecialties and at individual surgical centers.

The ACA has also been studied in the emergency general surgery population. One study found that among emergency general surgery cases, insurance status is associated with increased severity of disease.[6] The implementation of the ACA has also been shown to decrease emergency department use by young adults for non-urgent or emergent issues.[7] Equipoised to this is the evidence that the Dependent Coverage Provision of the ACA resulted in a reduction in perforated appendicitis,[8] likely due to a reduction in delays to patients seeking care. These studies support the notion that the ACA has had a positive impact on the utilization of resources and timely care delivery.

There are still many questions surrounding the true impact of the ACA. The aim of this study is to address the impact of the ACA on one academic medical center's elective general surgery practice. We hypothesized that after the enactment of the ACA there were fewer uninsured patient visits in general surgery clinic, fewer no-shows, and an increase in the number of elective surgical procedures performed.

Methods

Data source

This is a retrospective chart review of all new patients scheduled into a single general surgery clinic at the University of California San Diego (UCSD) between January 1, 2012 and December 31, 2015. This clinic occurs weekly and has not changed the number of potential patient visits throughout the study period. In addition, the referral pattern was not altered during the study period and consists of community and UCSD internal referrals. All patients were identified in the electronic medical record by the Clinical and Translation Research Institute (CTRI) at UCSD. Patients were included if they were new to the practice and over the age of 18. Pregnant or incarcerated patients were excluded. The study was approved by the UCSD Human Research Protections Program, Institutional Review Board.

Patient population

The ACA passed in 2010 and became a mandate on January 1, 2014. Accordingly, to analyze the impact of this mandate patients were divided into two groups: pre-ACA (2012–2013) and post-ACA (2014–2015), based on the date of their initial new clinic visit (Fig. 1).

Variables

An extensive chart review was conducted on each patient. Data on basic demographics (age, race and sex), dates of visits, appointment status, ICD-9 codes, CPT codes, insurance status (self-pay, private insurance, Medicare, Medi-Cal, Medicare and Medi-Cal, Medicare and secondary, County Medical Services, and Workman's Compensation), attendance to scheduled visit or "no-show", primary diagnosis, and whether or not they had an operative procedure performed, type of operation and the date of operation were recorded. It should be noted that the "other" category for race includes Hispanics.

Statistical analysis

The data was re-structured by merging patients with the same MRN into one entry, with multiple follow-up visits when applicable. The basic demographic data was analyzed and summarized. Univariate and bivariate analysis was performed using Pearson's X^2 test for categorical variables and Student t-test for continuous variables. The type of insurance for each patient was compared in

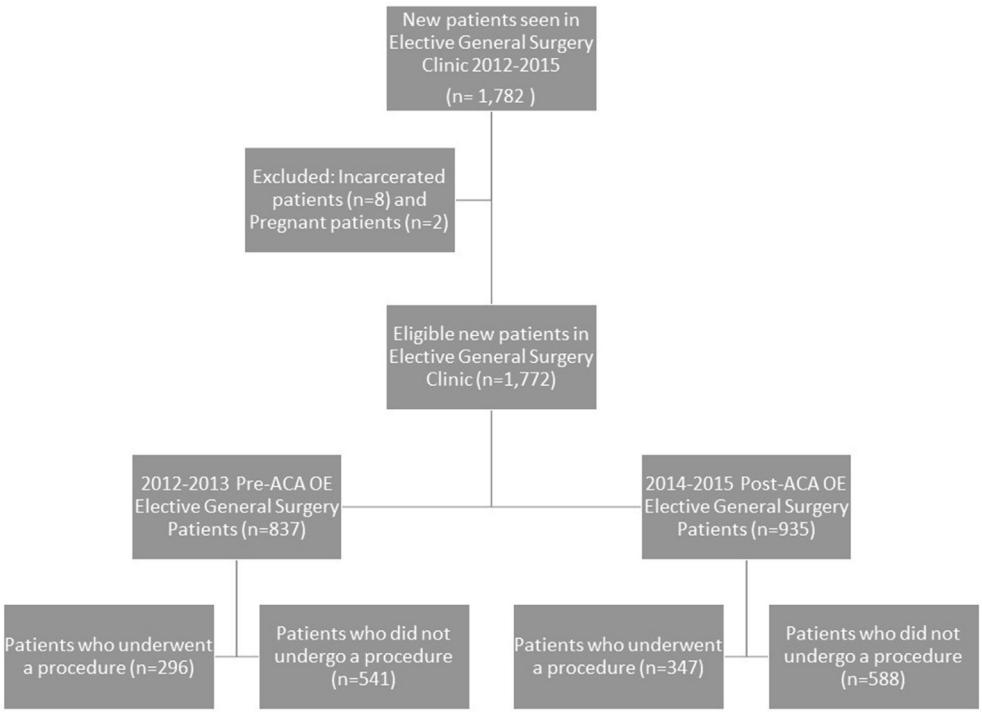

Fig. 1. Flow diagram of study design. Widespread implementation of the Affordable Care Act occurred in 2014.

Table 1
Comparison of elective general surgery patients demographics before and after implementation of the 2014 ACA OE.

	Pre-ACA	Post-ACA	P value
Population (N)	837	935	
Mean Age (y) (SD)	48.58 (15.58)	49.00 (14.87)	0.281
Sex			
Male	57.3%	58.5%	0.623
Female	42.7%	41.5%	
Race/Ethnicity			
Black	9.5%	11.1%	0.319
White	57.5%	49.3%	0.061
Other[a]	24.1%	30.0%	0.036
Asian	4.7%	5.4%	0.530
American Indian or Alaska Native	0.5%	0.7%	0.648
Unknown	3.8%	3.5%	0.757
Insurance			
Self-pay	9.8%	0.0%	<0.001
Private	31.2%	25.3%	0.041
Medicare	20.4%	17.5%	0.200
Medi-Cal	20.9%	56.7%	<0.001
CMS	16.8%	0.4%	<0.001
Workman's compensation	0.8%	0.0%	<0.001
Procedure Performed			
Yes	35.4%	37.1%	0.445
No	64.6%	62.9%	
No-show on first visit			
Yes	26.8%	20.7%	0.003
No	73.2%	79.3%	

[a] Other includes Hispanics.

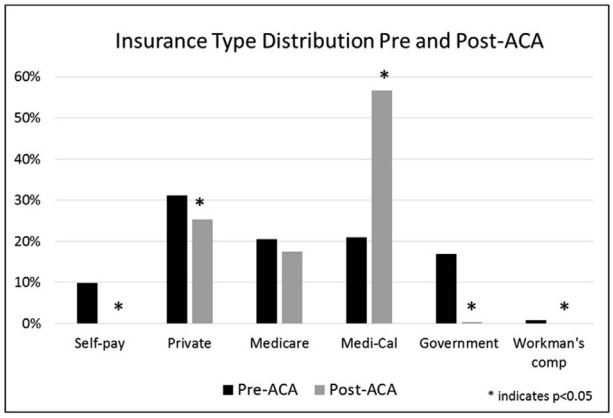

Fig. 2. Pre-ACA and Post-ACA distribution of insurance types.

the two groups. The total number of surgical procedures, as well as the specific surgical procedure were analyzed.

A sub-group analysis was carried out for Medi-Cal patients. The differences in patients with Medi-cal between pre-ACA and post-ACA periods were assessed using unadjusted (single-predictor) and adjusted (multi-predictor) logistic regression. All tests are two-tailed and statistical significance was set at a p-value <0.05. All analyses used IBM SPSS version 24.

Results

There were 1772 new patients scheduled in the general surgery clinic during the study period, with 837 patients in the pre-ACA period and 935 patients in the post-ACA (Fig. 1). In the post-ACA period the mean age did not change significantly nor did the distribution of gender (Table 1). The distribution of race only increased significantly for the 'other' group which includes Hispanics (pre-ACA 24.1–30.0% post-ACA, $p = 0.036$). White race trended down from 57.5% to 49.3% in the post-ACA period ($p = 0.061$). No other racial groups had a significant change (Table 1).

The distribution of insurance types changed significantly in the post-ACA period for all insurance types except Medicare. The most significant change was in the proportion of patients with Medi-Cal, which rose from 20.9% to 56.7% ($p < 0.001$). Self-pay status decreased from 9.8% to 0%, private insurance decreased from 31.2% to 25.3% ($p = 0.041$), and the proportion of patients with County Medical Services (CMS) decreased from 16.8% to 0.4% in the post-ACA period ($p < 0.001$). The notable differences in the pre and post-ACA distribution of insurance types are presented in Fig. 2.

The rate of "no-shows" decreased from 26.8% to 20.7% between the pre-ACA to the post-ACA periods ($p = 0.003$). The total number of patients evaluated in the pre-ACA period was 613 compared to 741 in the post-ACA period. Among all insurance types, the rate of "no-shows" was highest for self-pay patients (54.9%) in the pre-ACA period. There were no self-pay patients in the post-ACA period. Workman's Compensation patients had the lowest "no-show" rate in the pre-ACA period (14.3%), with no patients with Workman's Compensation in the post-ACA period. Rates of "no-shows" comparing the pre-ACA to the post ACA period decreased among private insurance patients (22.2% and 18.1%; $p = 0.357$), Medicare patients (19.3% and 15.9%; $p = 0.488$), Medi-Cal patients (29.7% and 23.6%; $p = 0.215$), and CMS patients (24.8% and 0%; $p = 0.184$).

A total of 643 procedures were performed, with 296 in the pre-ACA period and 347 in the post-ACA period. Though the gross total number of procedures performed was higher in the post-ACA period, the percent of procedures per patients evaluated was in fact slightly lower (48.3% pre-ACA and 46.8% post-ACA; $p = 0.750$). The type of surgical procedures in the pre and post-ACA periods is shown in Table 2. The only type of surgical procedure that changed significantly was inguinal hernia repair, which increased from 19.3% of all procedures performed to 28.5% ($p = 0.032$).

Similar to the overall change in the distribution of payer types, the distribution of payers for patients who underwent surgical procedures changed significantly. Self-pay patients decreased from 2.7% to 0.0% ($p < 0.001$), Medicare patients decreased from 22.6% to 15.0% ($p = 0.039$), Medi-Cal patients increased from 22.0% to 58.2%

Table 2
Comparison of the distribution of procedures performed Pre- and Post-ACA periods.

Procedure	Pre-ACA		Post-ACA		P-value
	N	%	N	%	
Total procedures	296		347		0.601
Inguinal hernia repairs	57	19.3	99	28.5	0.032
Umbilical hernia repairs	22	7.4	32	9.2	0.453
Cholecystectomy	53	17.9	48	13.8	0.228
Soft tissue disease	69	23.3	83	23.9	0.887
Hemorrhoids	33	11.1	32	9.2	0.466
Ventral hernia repairs	21	7.1	23	6.6	0.828
All other procedures (anterior approach, multiple procedures, lymph node biopsies and bowel resections)	41	13.9	30	8.6	0.061

Table 3
Sub-group Analysis of Medi-Cal patients.

	Pre-ACA	Post-ACA	P value
Population (N)	175	530	
Mean Age (y) (SD)	46.11 (13.65)	45.07 (12.88)	0.812
Sex			
Male	45.7%	56.2%	0.016
Female	54.3%	43.8%	
Race/Ethnicity			
Black	12.5%	11.7%	0.807
White	53.6%	43.8%	0.185
Other[a]	29.8%	37.0%	0.228
Asian	2.4%	2.7%	0.833
American Indian or Alaska Native	0%	0.6%	0.193
Unknown	1.8%	4.2%	0.154
No-show on first visit			
Yes	29.7%	23.6%	0.105
No	70.3%	76.4%	
Procedure Performed			
Yes	37.1%	38.1%	0.819
No	62.9%	61.9%	
Procedures Performed (N)	65	202	
Inguinal hernia	23.1%	30.2%	0.402
Umbilical hernia	4.6%	8.9%	0.296
Cholecystectomy	24.6%	15.3%	0.161
Soft tissue disease	18.5%	24.3%	0.437
Hemorrhoids/perianal disease	10.8%	6.9%	0.360
Ventral hernias	6.2%	8.9%	0.515
Other	12.3%	5.4%	0.086

[a] Other includes Hispanics.

($p < 0.001$), CMS patients decreased from 20.3% to 0.6% ($p < 0.001$), and Workman's compensation patients decreased from 1.0% to 0.0% ($p = 0.024$). The only insurance type which did not change significantly was private insurance, which decreased from 31.4% to 26.2% ($p = 0.280$). These results are almost congruent with the overall changes in payer type.

Given the significant increase in Medi-Cal patients, a sub-group analysis was performed to identify changes in this population. In comparing the pre- and post-ACA periods, the mean age was unchanged (46.1 ± 13.65 and 45.1 ± 12.88; $p = 0.812$). A significant increase in male patients (45.7%–56.2%, $p = 0.016$) was observed. The "no-show" rate, although trending down, was not statistically different between the two periods (29.7% and 23.6%; $p = 0.105$). The demographics, procedure rates and "no-show" rates comparing pre-ACA and post-ACA periods for Medi-Cal patients are shown in Table 3.

The univariate logistic regression identified male gender as the only significant predictor of becoming insured by Medi-Cal in the post-ACA period with an odds ratio (OR) of 1.53; $p = 0.016$. In the multivariate logistic regression analysis, adjusting for age, gender, and race, male gender remained the only predictor of becoming insured by Medi-Cal in the post-ACA period ($OR = 1.72$; $p = 0.003$).

Discussion

The ACA implementation had a significant impact in the general surgery clinic of a large academic medical center. This is most evident in the distribution of payer types with the number of Medi-Cal patients more than doubling and all other types decreasing. Most surprising was that there were no uninsured patients seen in the post-ACA period. As we hypothesized, the "no-show" rate decreased, resulting in more patients evaluated and more procedures performed. However, the actual rate of procedures scheduled per patient was not affected. Therefore, one cannot make the argument that higher rates of insurance are dictating more operations. Rather, there are more patients keeping their clinic appointments and being evaluated with consequently more surgical procedures performed.

Inguinal hernia rates increased significantly from the pre-ACA to post-ACA periods. Of the 99 inguinal hernias repaired in the post-ACA period, 62% were performed on Medi-Cal patients, compared with 26% in the pre-ACA period. The demographics for Medi-Cal patients shifted slightly towards a larger proportion of male patients of younger age. One could speculate that these newly insured patients under Medi-Cal are young, males, who are now presenting for elective inguinal hernia repairs. These are patients who, prior to the ACA implementation, may have been uninsured and thus, unable to undergo an elective surgical operation.

The state of Massachusetts began implementing mandated health insurance in 2006. Investigators studied the effects of that legislation on elective surgery (preference-sensitive procedures), and non-elective surgery. They found a 9.3% increase in the number of elective surgical procedures and a 4.5% decrease in non-elective procedures after the implementation of the legislation. The largest increase in elective surgery was in populations at the highest risk for being uninsured. From those results, it was estimated that there would be nearly half a million new elective surgical procedures nationally by 2017 due to the ACA.[9] New York, expanded Medicaid before the ACA. One study found the proportion of musculoskeletal surgical patients covered by Medicaid was 4.7 percentage points higher than expected after the implementation of Medicaid expansion.[10] Other studies from the experience in New York State reported an increased volume of procedures for Medicaid patients,[11] with a shift in the financial burden from the patient/hospital to Medicaid.[12] These studies are in line with our findings of significantly increased proportion of Medicaid patients being evaluated for general surgical procedures with a similar increase in overall volume.

An important question raised by the Massachusetts study by Ellimoottil, et al., is whether the increased volume represents a previously unmet need or a change in the treatment thresholds for patients and/or providers. Based on our results, the former appears to be the case, given the overall increase in procedures but relative decrease in the percentage of patients evaluated who underwent an operation. There are many components to the ACA, which are summarized well in the paper by Rudnicki et al.[13] In addition to the individual mandate and Medicaid expansion, the components discussed include cost, quality measures, and Accountable Care Organizations (ACOs). The "pro" argument of the Rudnicki et al. article divides the positive effects of the ACA into three categories: 1) Insurance industry reform, 2) Expansion of coverage, and 3) Improved access, outcomes, and reduced costs of care. Meanwhile, the "con" argument emphasizes that there is no direct link between health insurance coverage and health care, concluding that among increasing access, improved quality, and cost reduction, only two of the three can be achieved. In response to this argument, the results of this study support the "pro" argument as indicated by the expansion of coverage, with uninsured patients becoming obsolete and an improved access to care with more patients being evaluated occurring more often.

There are several limitations to this study. Retrospective chart reviews though conducted carefully inherently have the potential for inconsistences between the results and the actual clinical data. Chart abstraction was done by one individual to limit these inconsistencies. Though the total number of clinic visits available didn't change, an increase in the population could have also impacted the increased number of patients seen in the post-ACA period. We recognize the fact that there were no self-pay patients identified in the post-ACA time period. This may be due to recording errors in the medical record. However, it does not reflect a change in clinic policy as we do not discriminate based on insurance coverage. This study did not address cost, which is clearly a logical follow-up that the authors will be pursuing in future studies.

The study also did not assess long-term outcomes. There is some evidence that patients with government insurance tend to have worse outcomes.[14]

In conclusion, this study demonstrates that the ACA implementation has led to fewer uninsured patient visits, fewer "no-shows", and increased number of elective surgical procedures performed in the general surgery clinic of an academic medical center. One can infer that access to surgical care has improved overall after ACA implementation. With the evolving political climate and its impact on the future of healthcare coverage, it is crucial to study the effects and progress of such legislations in the healthcare system. Studies such as these allow us to critically evaluate systematic changes and make more informed decisions regarding future policy development.

Conflicts of interest

The authors declare they have no conflicts of interest regarding this work.

CRediT authorship contribution statement

Lilianna Yuen: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Writing - original draft, Writing - review & editing. **Todd W. Costantini:** Conceptualization, Methodology, Writing - review & editing. **Raul Coimbra:** Conceptualization, Methodology, Writing - review & editing. **Laura N. Godat:** Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Validation, Writing - original draft, Writing - review & editing.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.amjsurg.2018.11.004.

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